

PCT

1EMKIHABOPTAHII3A IBB
mn lvr AIM110RCOBTBEm10GTHI"
MawayaspomerelCove



IMIEXC YHAPOAFIAH 3AHBKA, OIIYBJI KOBAHHASI B COOTBETCTBH
C ,1{OFOBOFOM 0 IIATEHTHOI KOOIIEPAIII3I3 (PCT)

)Mena yeaportyae arraccsltsa:autwt
sao6pereas:e
A61N15/06

(11) Hoaep rceacpytrapoga:o6 ay6maanaa: WO 96/25978
AI (43) A^Brameamyaapopnoti
ay6u@cat ea: 29 army ra 1996 (29.08.96)

1) Homep neagyxaponnott a rnica: PCT/RU95/00211

2) Sara 116:1epyEapOnn0 t uuoAaaa:
27 ceam6pa 1995(27.09.95)

0) jlae se o npnopwrere:
95102749 24 4respaaa 1995(24.02.95) RU

181) YxaMuarete rooyAapersa: AT, AU, BR, CA, CH, CN,
CZ, BE, DK, ES, FI, GB, HU, JP, I(R, MX, NO, NZ,
PL, PT, RU, SE, SI, US, esponeiicxsdt rtarewr (AT,
BE, CH, BE, DX, ES, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).

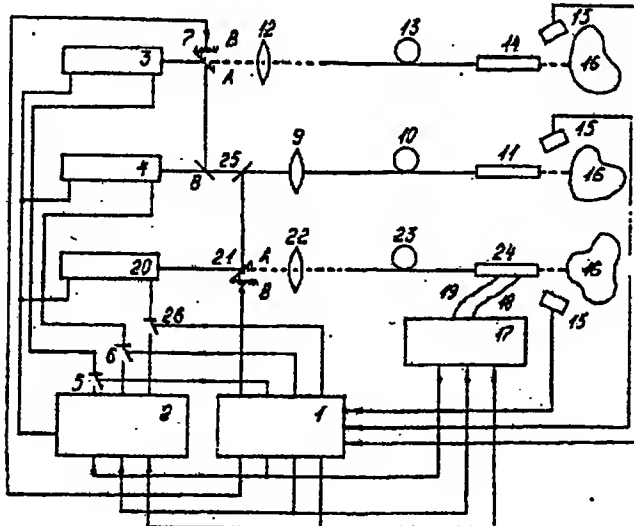
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IX72) 3aacarem. st aao6perareas: AJIbTIIYJIEP rpao-
pa~ Eapecoaa4 (RU/RU); 96240 Caere-Ile 4p6ypr,
Ilymmscae mocce, A. 6, icopn. 1, xa. 97 (RU) [ALT-
SHULER, Grigory Borisovich, St.Petersburg (RU)].

54) Title; DEVICE FOR USE IN THE LASER TREATMENT OF BIOLOGICAL TISSUE (VARIANTS THEREOF)

i4) Haasaaae a oobpereaaa:YCTPOfCTBO ,ILJla JIA3EPHOla OBPABOTXM BHOJIOTHFIECROf TRAHN (ErO
,APHAHTiD



57) Abstract

The devices, comprising two or three pulser lasers (3, 4, 20), are provided with a system for the automated optimisation of the parameters pertaining to the radiation of the two lasers and to the type and method of treatment applied to each type of biological tissue. The outputs from at least one receiver (15) for receiving data on the condition of the biological tissue (16) being treated are connected to the inputs of the control unit (1) whose output signals are applied to electronic switches (5, 6, 8) incorporated in the links between each laser (3, 4, 20) and a power supply unit (2). The devices also include a controllable irrigation system (17) for irrigating the treatment zone and a mixing system for mixing the laser beams. The latter system empties reflecting mirrors (7, 21) and selectively reflecting mirrors (8, 25) and makes it possible to produce independent radiation outputs.


Orb!P•4)■p,rr

В *уCTpOI%CTBa*, **COCTOEI\$HC** *H3 ABTA* **NJIIH TpCX** HMIIynbCHWX na3epOB (3, 4, 20). B\$CAOHa CHCTCМа aBTOMATH'ICCKON OITHMH3auHH наpaMeTpOB H311yNCHHS 3THX J a3epDS. TH11Ob H pCZZHMOB o6pa6oTKH AIL9 Kaznom13 BHZa 6HOJ10111¹*ICCKOA TKaHH*. BbIXOA61 XOTli 6u OAHOT'O npHCMHHKa fiHt4OpMaIUHH (15) o COCTOAHHH o6paбammacuо i 6HOTKaniH (16) COCAHHCHbI CEXOIIUMH 61noxа ynpaBncHHZ {1}. BWXOIIHWC CHrHaFLI KOTOpOTO Honiara Ha 9JICKTpOHbIC)CJ1109H (5. 6. 26), yCTAHOBilCHHbIC B UCfAX COCIIHHCHHA Ka)IUIOCO na3epa (3, 4, 20) c 6noxoi нHTAHHA (2). B ycrpOrICTBa BKJnO'TCHbl TaX.)KC ynlpaWscMas CHCTCМаa . opowCHMI (17) 5oHb1 o6pa6oTlcH H CHCTCМа CMеWHBWHS H311)m6HHA na3CpOB, COCTOSWAR 113 OTpa*aTcJlbHbIX 3CpKa11 (7, 21) H CCJICKTHBHO OTpa i(aTCJILHLU (3CpKAn (8, 25), npcfcycMaTpHBa[ol.uau BO3MOZ11OCTh H HC3altHCHMLIX BIXOIIOH H3J1y'ICHHYI.

HCIUIK!'IBTEAbHO!JUIA =J=Eft!HH.OPMALjHH

Kona|>rcnaarayaweJ,Jtto6oama⁹exu!crpax-who!PCT!na!myefiaa!inter=l6ponmp,la!=opwz
nl6mikywrealicas~xapolua~!ammo!s!eochw!tersne!a!PCT.

AT Anemia
AU Ascipaxxa
BB **W**oe
BE
BF Symms 41sco
BG Sam
BJ \$aal
BR
CA Kalac
CF llearpaJuatoatlHasicamas!
BY
CG KIDpra
CH nbelhapsul
CI Knapp:
CM Kant
CN laog,soalyuni
CS rra PKar6uoaes
DE Tap
DK
ES

FR Caws=
GA  e6guersina
GN
GR &Wpm
HU Hpsalote
JP ICapelicuan!Halomo-Aebur
KR
K
LK
LU
LV
M
ML
MN

MX Maspstraanct
MW
NE llnrsP
NL Hmnepsaings
NO &pima
NZ How wauc
PL Mann
PT Hamm!=
RO Pyabnasa
RU Pq slOeRept+t
SD CIA
SE
SI Csomnia
BK aann
TO Jan u
TG Torn
UA Yxps=A
IJ6 Col!lmau!Qirsrm
UZ AmsplOal
VN!Biencuc .a

eTpc!cTaaO J-ITili 3 n3epHOS1 06pa6crrKH
6N0J101711eCKON TKaHH (OPO BapHAHTbi)

O6naCrb TCXHHKH

H306pCTCHHC OTIOCHTCA K MCAHUUHCKOH TCXHHXC H MOZCT 6brnb
5 11 Cn011b3ODa110 B XHpyrTHH, OpTOneAHH H CTOMaTOForHH ARA o6pa6oTnH
MArXHX H TBCpALIX 6HOJ1oflFYCKHX TKaHCN.

TipCAUICCTBy10111HH ypOBC111, TCXHHKH

H3BecTHO ycTpoicTB0 an o6pa(oTKH TKaHeH 3y6a Jla3CPHIM
H31ly4CHHCM (naTCHT WO 90/01907. A6IC 5/00, AaTa ify6nHKawHH 08.03.90).
10 coiepxcaluce nOCJICAObaTCJILio• pacnOJ10)ICCHHC BAOnb OTITH4CCKOH OCH
HMIiyihCHb114 Jiaacp *HCPCACT60* AOCTaBKH H3J1y1CHHB K 3y6y. BXA104a10IUCe
OTpe30K OTITHMCCKOTO *BOAOKHa*, BXOA KOTOporo OiITH4CCKH connoCCH C
BLIXOAOM naacpa, H HaK011C4HHK, Bxo2 KoTOporl onTHYcCKH COnpA7KC11 c
BLIXOAOM onTH'CCKOm BOJ1oKHa, a *Blaze*, ABIIACTCA 13L:XO310M *yeTpoHCTBa*.
15 *IIPHCM*. B KA'ICCTBC naacpa MO)KCT 6Lrrb HCHOJ1.30Ba11 KSK HeOAHMOBL11i, TaK H
rOnLMHeBL111 .WDr 3p6HCBWN na3Cpu.

OCHOBHLIMIIICAOCT4TKOM AanHoro ycrpOHCTBa ABTIACTCH HCB03MO)KHOCTL
61,ICTpOH 3aMeH111 mom na3epa Ha ApyroM B133BHCHMOCTH!OT THna
06pa6aTWBaCM011 TKaH, a TaK)KC BLICOKa 1 onaCHOCTI, Hanccexxx *na3epHOH*
20 TpaBMLL

H30ecr110 TaKXCe ilaiepr110C yCTpOHC?BO AAA HC4CHH51 3y6OB, icOTOpo
ABnaCTCA JUIHCX111tC 6AH3KHM 110 TCXHHYCCKOH Cy111Y.oCTH H npHHATO 3a
nparorxn (nareltT WO 90/12548, A 61C 5/00, Aara• ny6nnKauil 01.11.90).

J 0 ycrpOHCTBO COACp)KHT CuicK ynpaljicilHA. Ana HMnyJILCHLIX na3epa.
25 QUTH9CCKHC OCH KOTOpLiX napaAACJib1114, pacnO11o)KC1111WC 11a oflTH *ecKOH OCli*
IVTOpOnd ilalepa. CiXIKyCHpy101ilylo CHCTCMY H OTpe30K OnTH4CCKOro BOAOKtia C
Itaxotic'niHKOM. Ha 011TH4CCKHM OCAX OCX1HX naiepo pacnOJ1ioAcem.,t fOA yrnOM
45° K QCSIM 0 rrmecKH COnPA)KC1111LIC MC1Kly COCIOH, i oKyCHpyTOUICM CHCrCMOH
H 011TH'CCKHM!BOJ10K1•UM 3epKaJ1a. 3cpKailo. paCHOHO)KC1110c Ha OCH nCpHOR)
30 naicpa oTpacxaTCnbloe, a ua ocii , BToron) na3epa - AHXpOH4110C;
'T.e.cenCKTHnlo OTpa)KaTC111,110c Ana AJIH114 *Buum* H31ly4enna nepnom na3cpa
H npo3pa4HOe A1111!A11HH1.!!BOA11101!H311y4Ci1HA!BTOpom.

Ociow um HCAOCTaTKOM 11pOTOHna AW1CTC31 IICA(1LTaTO411aA
At)N!ICKTHRHOC TL cm npfMC11CH1A npH PCpCXOAC OT pC)KHMa OAHOIOT Hna
35 o6pa(crrKH K ApyrMy H ouaclocrt. mane-coma TpaBMLI, cnA3anna e
OTCyrCTBHCM CHCTCMLI unpaCACHSI nnua o6pa6aThBacMOH TKaHH.

PSCKpLR'HC H306pCTCUHA

3ana4a. Ha peuicline KOTOpOH iianpaluuenti 3aa1UIACMOC H3o6perinc.
3aKJ1104aCTCA It co3Aa11HH yCTpOHCl 11a UJD1 JaaCpiioil ofpa(oTKH 6H0110TH4CCKOH
40 TKaHH, BLtnoJHataulero ix:e BHAW Jlaiepnwx'MCp 1HH B XHpyrHH, opTOneAHH
H cTOMaT11nnrx. C 06CC11C'CHHCM npH 5• tTh(no3MC))KHuCTH 6WCTpelm nepexoAa
OTIOAHOpO THna o6pa(nTKH K ApyrOMy H MHMHMaJ1W1011 14111a3HBHOCTH.

YKa3a1111asl iaiia'la pCUJ3CTCA IpH OCy111eCTBUTeHH H306pCTCHHA 3a cyc7
foCTHXCellHA TCXiM4CCK(WO pC3yJlrTaTa. 3aKJ1N14ammeroCit H OnTHMH7aUHL

pC)KNMo8 OGpaGOTKH H nap:we:rpou J1a3cp1lon) Irsly4cluix A1a1HCHMOCTH OT THfla O6pa6OTKH H BHJ1a 6HOJ1O rH4CCKON ?KAHN.

- YKa3aHHJIH TeXHH4CCKHH pe1y11bTaT Hph OCyUICCTWICIIHH H306pCTCHH2 AOCTHpaCTCA TEM. RIO B yCTpOFICTBO nnIA ia3Cpt101n o6pa6oTKH 6HOnorH4ecKort
- 5 TKaHH COACp KalUCC 6J1OK yflpaliuCHHA, 8IdXOALi KOTopOro COCIIHHCHbI C 6nOKOM IIHTaHH 1 Jia3CpOB. HMnynLCHLIC naacpf4, OJTHMCCCKHC OCH KOTOpbIX napanLICJ1bHbI. OIITH4CCKH COIIpHXCHHIUC OTpazaTCJ1bHOC II CCCKTHBHOC OTpA*aTCnLHOC JJ13 HaHIII 'mama =poor') Aa3cpa Et 11p03pa4Hoe UJA JJ1IHHbI BOJ1HbI BTOPOTO J1a3Cpa 3cpKalla, ycpaHoact11114c Ha OCAX ncpnoro H BTOPOTO
- 10 J1a3Cpon COOTBCTACHIO, yCTaIIOB1e111bIC Ha OIITH4CCKOII OCH BTOPoro Aa3Cpa (OKyCCHpyIOWylo CHCTCMy H OIITHMCCCKOC BOJ1OKHO •C HaKOHCH4HHKOM. BLIXOJI KOTOPoro 2BJ1WCTCA OIITH4CCKHM IIIA020M yCTpOAC1Aa, BI3CACH XOTA GLI OJ1HH 11pHCMHHK HIRI)OpMalHH O COCTOAHHH 6HOJ1OTH4CCKOII TKaHHH. BXOII KOTOpolo COIIpA)KCH C MCCTOM ISO3ACHCTBHA Ha TKaHb. a ALIXOA COCAHIIICH C BXOAOM
- 15 GAOKII yllpammCHHI, BIIXO214 KOTOporo COCJ1HIIe111 C BXOAaMH BJICKTpOHIIIX Knio²cH, yCTali06nei111 ix n UensX COCAHIIcIIH Kaxnor) na3epa a 6nOKOM ImTAIIHA. Orpa)lcaTCJ1IAOC 3CpKallt) _ycTallonnc1u) C lu)3MO)KH0CTLI() nutsoJ1a CR) H7 X011a H3J1y4CHHA, a Ha)IITH4CCKOA OCH Iicp110n) J11nCpa II0CJ1ICJ1e)BaTCJ1bIIIO 110 X021y II il1y4CIIHx pacno.noxtcn j tX)KycHpyloluas CHCTCMA H OIITH4CCKOC
- 20 BOHOKHt) C HAKOIIIC411HKOM. AbIXOa KOTOPoro AI1J12CTCA IIpyCHM OIITH4CCKHM BLIXOAM' yCTpOHCTBa.

- £anCe 3t KTHBHOC yKa3a111b H TCXIIH4CCKHH pC3yJ1LTAT aOCTH1'aCTC31 TCM, 4TO A ycrpot'cTao aj1A . na3Cp11OH oGpa6oTxH 6Hnnorw ccKoi1. TKa11H, Coaepx(awec GJ1OK yllpaliuCHHH, ALIXOU4 KOTOPOnI COCaHIIcII4 C GnOKOM
- 2.5 II TalIHA J1A3epOB, HMny11LCIIUC J1a'ICp14, OfTH4CCKHC OCH KOTOpbIX napantenw11. OIITH9CCKH COIIpHICKIIIdle OTp12iCaTCJ1IIIOC H CCJICKTHBHOC orpa EaTenIHC)e 1111WJUIIIBI ntuntbl nCpllt)m J1a9Cpa H 11ptripa411t)C 1U151 Juu1u,l A(n1lu,t BIdpOn) J1a'ICpa 'ICpKalla, yCTailt)iUIC11114C Ila OCAX IIcpBOn) H BTOPOn) J1a3CpOII COOTBCTC HCHHO, yCTa1101Ue111MC Ila tII't'H4COCOA OCH BTOPOn) J1aliepu
- 3.0 (Poxyclipy>outylt CHCTCMy N OIITWICCKOC IuutoKHt) c IIaxo11C411HKOM, nJ1Xon KOTOPOn) 2BMCTCA OIITH4CCKIIM BMX O110M yC IX)11CTBa, BBICaCII TpCrHN HMflyJ1 cII11N JJ113Cp. OIITH4CCKaH OCb KOToporo napanileJ1t,1la OTITWICCKHM OCHM. J1tyX apyrHX naIepoB, a I1u en) OCH yCTaIIonJ1C110 oTpaIcaTeJ1bHWC . 3epxallo, flpH4e.M OTpa3caTCJ1114114C 3CpXana yCTIK Iu1c1114 c W 1moxfle)cTbu) mamma mx
- 35 xoua H3ny4en'1A. .Ha OITU ICCKON OCH 11TOpon) Ila3Cpa 3a CCJICKTHJ111bIM 'ICpKaj1OM yCTaIIOB11CIIo A'11)pOC CCJICKTHIIdle OTpaxc11TCJ1ibi0C AJ1A J11n1111 A1)7111J TpCTLCC(1 J1uriepa II 11ptYlp 41to : iLW JUIH11J H(U1111i IICPII011) H 11T0pOn) 111'3CpUA 3C0KWIO, OIITH°ICCKH C1)IIpA*CIIIIOC C 0Tpa)lcaTcnb116IM 3CpX11110M, yCTaIdOIUCn1111IM Ha OCH TpCTbCII) J1a3Cpa. C 4)tXyCHpy1OWCN CNCTCMON H
- 4.0 BXOAOM OIITH4CCKOn) BOHOIC11a, paCUW10)KCIIIIJX Ha OCH BTOPOI't) J1a3cpa. KpOMC TOIL(), 1111 KU)KU01 It3 UCCA ITcpnoro H TpCTI.cn) na3Cp011 110CJ1CaO11aTCJ1IIIO no xoay H3ny4cIIHA pacno.11oxccHW tx)OKyCHpy1OWax CHCTCMA H OfITH4CCKOC BOHOK110 c IlaKOIIC411HKOM. 111,1X0214 KOTOpbIX J1MAIOTeII OITWICCKHMH AXOJJAMH ycTpoIICrna. YCTpolICT11cJ1TaK*CI Cila6ECC11OI XOTH1(iii

0111111M npHcM::HKOM1111141OpMaUHH10!COCTOZIHHH!61iO110rtxCKKOi!TxaIIIi.IBXOi
KOTOp01'O!COnpAJKCIIC!MCCTOM!BO3ACHTBHB!Ha TKat1b, a BLIXOA coeatmCH C
BXOAOM!6nOKa ynpatuieftwi. BLIXOALI xoTopopo COCAH!CHLI, c BXOBAMH
3neXTpOHIILIX KJIIOYCH, yCTaII013IICHHLIX BUICTEX COCAHHCHHA KaXCAOCO na3epa c

5 6noKoM naTaHHA.

1lpHCMHHK!MH1hXpMa11HH!C!COCTOAHHH 6Honont4ecKoi TxaIIIH Mo!zcT
61rrb BLIn01IHCH BBH11C CRCKTpOatla/IH3aTOpa B 06JJaCTH 200 - 1500 HM.,!BXOft
xoiopopo oUTM4CCKH!CoIpAXCCI C MCCTOM!BO311CHCTBHA!IHHTKaHLK
cOCTOXUuern143 BHCnepCHOHHOro 311eMCHTa, 11HHCKH I,CJTOACTCKTOPOB H
10 311CMCHTa.cpan'IenHM.!HpHCMIMK!NW!OpMauKH!O!CO TOAHHH 6HMOTH!MCIO
TKaHH Tax!KCI!MOXCCT 6l,wmn BLIn0JHCH H BHAC (JOTO3ICKTPH!ICCKOTO!RpnCMIIH\$a
Htd!paKpaCHOr/) WUiyCHHA. BXOUXOTUpXIU ORTHYCKH cot1pEJKCH!C!MCCTOM
Boiae CTBlisl Ha TKaIII, foCpCaCTNOM nonoporloru 3CpKarla, pacilunozeHilorc
Ha ORTHYCKON OCH Jla3Cpa MCZKay B.IXOATLIM 3cpxanoM Jla3Cpa H
15 IIUKyCHpyi uici; CHCTCM0il 4CpC3 4)HILTP c noJIOCON nponycKatUtl,
HCKAIOYaIOUICH!1101132ailHC!Ha!1pHCMIIHK H3Jly4CI1HR na3Cpa.

!FpHCM)!MK. H11(c)OpMal1HH u!CUCTOHIIIH (IHOAO!13YCcxof TKaH!t MO7KCT
GLITZ CWC BLpHUIHe11 It BHAC axyCTHYCKKoro!npHCMHHKa.!yCTah)OBIIICH110FC)
TaKHM!O6pW OM. 'ITO IlailpalulelmC el%) MaKCiManbHUK!YyitCTUHTCJ1bt1OCT11
20 COCTaBJIHC!C IlanpanncIIHCM otrnvicKoi! OCii ila BxonC HaKOHCYHI!Ka yr0J1 a,
yaOBJICTBopa10111HH yCII0BH10: I 1 °<a<86°

BACK TpOH11Jli XJIOY Mtj)KCH! 6JLITI 11(.11tor!ttCtt ii L'H,3C
nonynpaiUII1HKU10111 11111 WICK TpOliaKyyMtol'n HCpCKJ1109a1c1 s1.

A01101111ITCJL110, yeTpOHCCTno cila(mtell(cHCTCMOH opouiCillisi 90i11.t
25 o6pailoTKH, cocpoRUwwfi in petepityapa .am BOULI ItoasHILIM HacocoM!it
It03A)IIIIlorO KoMIIpl:ccopa, cooTBeTernyc!IIU1elnLIXOALIIKOTOpL(X 06'l.CB 11 1141 1111 It
tlaxor 11HKax HAUIUxtOTCxlHpplllra1mH(Iun,IM)i BIJXOauMil yCTpt) CTBa, a
Bo3AyulH.IH!XOMnpeCCOp!B!Stec..7e COCAHICIIHA C110311)XO17p0\$UAAMii cna6:fccII
a11CXTPOMaf1!UTJIIJMI KJlan:llaMH, nOAXJ1104enil1MH K nLIXOJlaM 6noKa
30 yitpatuleIIHA iepc Jnililui 3anep KKH.

H3necTHO. tiro 3t~)t~CK3'Nlui()CTb JlaephIOJ o6pafx)TKH 6HO11orwicoH
TKa!!H C OA1101tpCMCH1LiM O6CCHCYCHHeMIIHH3KUHIIHna314BHIOCTH!(cTCne11c1
HeKpO3a)!3aIHCHT!OT!,MHIIbhl•110111111H monument Jla3epIIOrO H3Jly'ic11HA.
3HCprHH!H!HpCMCIII Jla3epIIUro B03JtCHCTa11511t. JLitl HCKCITCpbIX B11110B TKalili,
35 ZHAKOCTIIOrO opOluCHH11 7OHLI na3cpiofri O6pa6OTKH!(CM.,!HanpuMep,
Proceeding of ... Laser-Tissue Interaction V 24-27. ,january 1994. Los
Angeles, California Vol 2134A).

HCCJcm)Aii111lx, npmeltei111Je alcropoM, HoKa'i.11111, 'i'ro Hp!1 :~Ttjm
IIeofixo!IHM:I 0111lonpt;MCinlasi On33iMH'tali!ix yica'laliinix napaMerpu't ansi
40 Ka)K1101'11BHua 6Ho1'KiHiii!FIIMMIt CJ1011aMII, HCof!xonitMhi:

1. BO3MUZHOCT1. Bbl6opa onTHMaJII.IIMX.I.NJIIH!BOJZI!IIUTyTCIIHN!Jia3Gpol!MIII!HX
CMCCH,

2. *peflicrpauHn npauccea na,eptiotii AcCTpyKuiiH. BHAII H COCTOAHHA 6HOTKIIHH*
H ynpfB/CHF A AJIHHOil BOJIIILI, MOLLHOCTLIO, 3HeprHCH H BpCMCHCM na3Cp110P0
ACHCTBHA.
3. CHCTCMA Opowe) 3011111 *lia3ep110H* 06pa60TICH.
- 5 COBOXyTHOCTb BOCACHILIX B *ycrhoicTBO* XOTR 6Lr oAHOro npHCMHHKa
 HH4OpMa11HH O COCTOAHHH o6paGaTWBaCMO4I 6HOJiorwlcexOlt TKaHH, BWXOA
 xoroporo COCAHHCH C BXOAOM fuloxa ynpaEICHHA, H 311CKTpOHHLJX K_n104CI,
 yCTAHOBJICHHLIX B HCILAX THTAHHR *na3CpOB'H* ynpaBrRCMLIX BWXOAHLIMH
 rHilialtaMH 6110Ka ynpaBJicHHR. npCACTBB11810T C060N CHCTCMy 06paTHOli CBA3H.
- 10 KOTOpax o6Cne4HBacr ABTOMaTH4CCKHC *KOH'* rposU H OTITHMambHOC ynpaBJicHHC
 napaMeTpaMH W ly'ICHHli na3CpOB B 3aBHCHMOCTH OT BHAII H COCTOAHHR
 o6p_n6amrBacMoli TKaHH H, TCM CAMLIM. O6CCnC^yHBACT MHIIHManbHyIO
 HHISa3HI)HocrL.
- 15 HC06XOAHMoCTL anTOMATH4CCKHX K0ln-pans H ynpaBJICHHA BW3BaHa
 4aCT0 B03HHKIIIOWei HCB03MOJKIIIOCTLIO BH3yanbHOCO OnpCIIJCIIHHli Bpa90M
 COCTOAHHA O6Jy'aCM0 % TKaHH H CC BHAA.
- HaJIH4HC ABYX IIC3allHCHMLix BLIXOAOB B OAHOM *yCTpONCTBe* 6Jlaroiapn
 r103MO)KHocTH BLtnona nrpa*aTenbnurt) 3epKana H3 XOJJa n3nyYCHHA ncpiopa
 Jlaicpa, a TaKMCC B03M0)Klform 'C MCI U Huai I li A H3ny9CHHli ABYX n r epon
- 20 noBwwacT' ;c *KTHBHOC TL pa(x)TL, lipH 06pa6OTKC **CHOTKAHH**.
 Ha m%)He B on 'Tom ycTpocTBe am cI GpaGoTKH CIIHOJcOTH4CCKOlt TKaHH
 TpcX *naJepOB* C pa3JIH'I11,IMH IUIHrUAMH Ball If H11ly'iCIHHH It HC3afHCHMGtMH
 maxoABMH H . C B03MO)ICIIIOCTW) CMCIIHHBa11HN M3ny4eHHli 06CCrIC4HBaCT
 1laH6nnn1.LHylo maim U,liocTb rIpMCIICIIHA yCTpOHCTBa H MaKCHMallbHO
- 25 *pacwtips*eT ero BtnMt) KITocTH. Hanpn1M(:p. npH OAIIOBPCMCHHOM B03ACHCTBH
 R)J11.MIicBI,IM H IleouHM0131,IM naicpaMII la o6IyJ11(1 xponoIIaCldWeiiiwe Opra11LI
 CIIHMat.Tcx onlacuacrb Kpt)lu)re4emu, npl 1IccaliKHoiIHpoBalldoli nep4x)pailHr
 KPytullIX Kp(NUIIOCIUwX COCyAOB, a C04CTAHHC H ii 3pHCBOru. Jla3epa C
 HCOAHMOIIMM H rObMHCBbIM 9t KTHBil() npH O6pa()oTKC =flux **'Malta li**
- 30 TBCpALIX TKallCH 3y6a. *AJLa* CMCWHBa11H31 H311y4C}1HA TpcTLCrO naicpa C ABYMSI
 ApyrHM11 WLH Ka)KIILIM H3 IIPH BBCACHW OTpaAUITCJILIIOC H CCJICKTHBHOC
 3CPKaria. yCTa11OAJICHHWC COOTtcrerIICIIIO Ha OCAX TpcCT1,000 H BTOpOra
 na3epon. a B03MO)IAIOCTb BI4IK)Aa OTpaXCaTC:wbn11X 3CpKan in xona H3ny4CHMI H
- 35 HaJIH4HC AOflWIIIFITCJILIIIX CxOKyCHpyIOWHX CHCTCM H C)HTH'icCKHX BOJ1YK011
 o6eci,c' IHBACT IIC UBHCHMOCTb TpcX OHTH'ICCKI4X BKIXOAOB yCTpoiCTBa.
 A)nonnIlrTCJILIIIO BIIICACIIHall B yCTp_nNCTIul CHCTCMA OpojCIHR,
 ytl()a11TISlt;MaA 9JICKTpOMa11HT11WM}i KJlaIIILHaMH. II011KJII04CIIIIIMH K BbiXOAIIIM
 (inoKa ynpalm CIIH3f OGeCIC IH1)aer orrrrt) LHblne Ca4CTaHHC pCXH Mots
 0611y'ICIIHA H ()pO111CIHSI TKaHH.
- 40 17U CBCACHHAM MITI)pa CO&)KpiNEWT b H3103KCHHbIX B tt)OpMynC
 H7o6pCTe11HA npH3IIaKOB • AMACTCA IIo110II. a cam() TCXIIH4CCKOC pollen He
 nn0BruCTropII CT KpHTCpliK) " H3n(SperaTeJILCKHiH yp011elib "

Kpar oe annalule 4epTex(er

Cy111HOCTb WR)6peTCHHR noxcmx'eTCB Ha 4pH yrax, rite

4n1r.1 - H3o6paxac-r CXCMY ycrpo%cmma nix Jla3cpHO % o6pa6OTKH 6HOTKaHII.

4 3Hr.2 - CXCMY napHairTOB BbtfOnitCHHJI H pacnonO (CHHA npHCMHHKOB

5 H1HbOpMa11HH O CoCTOAHHH o6pa6aTLIBaCMOH 6moTxamH.

4Hr.3 - CXCMY ycTpoHcma npH HWIH^MIHH Tpcx na3CpOb

430.4 - CHCTCMY HppHraluKH.

4,Hr.5 - 6aOK-cxeMy 6rioKa ynpatillCHHA.

YCTpoHCTBO JlnR na'epnoil o6pa6o7'xH 6HOnorH ccxoH TKaHH (4 Hr.1)

1.0 cocTOHT H3 6nox a ynpannCHHA I, cocaHHetmoro c HHM 6nox a nHTatnIR 2, HMnynbCHblx Jla3Cp011 3 H 4. COCLHICHIIIX C 6nOKOM fHTaHHA impel

aJ1CKTPolrHW'e tJlIO⁴H 5 H 6. KOTOptae noaKnK)tielt,t K BbiXOnaM 6noKa ynpaLleHHA 1. Ha OnTH'4ecKHx ocxx na•lepon 3 H 4 pacnonoM(Clibl. COOTBCTBCHHU, uTpa*aTcnlilloc *icpK-JIO* 7 H CCACKTHBHOC 3CpXMo 8,

15 KOTOpbC OOTH⁴ICCKH COItpA)KCIIGI MC)Kay co6oH, 4t oKyCHpyloIII CN CHCTeMC '9 H Rr.IXOAlimM TOpUoM ofTH4ccKor) .noiox11a 10 c IlakoHC4HHKOM 11, pacrtonoM(CIIIIux Ha *onTH4ecxo%docu* na3cpa 4. CencrrHnItOe 3CpKaJio 8 oTpa)KaTenbilo JlnA H311y⁴CHHR C J1HIIIOJ(nonubl na3cpa 3, Jno npo3pa4110 JUTA

H3ny4CHt1 CJUIHHON 1 O.11ll,t Jta3cpa 4. Pacno11oxtefnoe .ila ouTHdCCxoit OCH na3cpa 3 oTpaXaTent,IIor: 3epxanc) 7 IIonKJHo'idto x nbtxoay 6noKa yyTpalvlCHHA

20 1 H B ncuroxetuul A yCTallalunrtac1cB BOX yrlIUM 45° K OcH, a B nOMKCI111H B Ilapanncnbttn eH. Ha aTO⁴ ixet nett iICJ1Ca 'la 1epKanOM II)CJteaOBaT:(nbl(1 1la XO1y H3ny⁴CIiHR paCIIIOJIOZC111bl 4'loxyc{ipyioivaSI CHCTCMa 12 H OitTH4cCKOC BOJIOKUO 13 c ttaKUUC:411HxoM 14. K nxouy 6J Oxa ynpalmcHHSI 1 nouxniotreu

25 3iCKTPH⁴ICCKHH BbiXoa IlpHCMHHKa H114bx)pMa11HH O COCTOA11HH 6HoJIOH⁴ICCKOH TKa11H 15. nxoi KOTOpOpO ConpA)l(CII C MCCruM IlolJlc%CTBHA Ha fHOTKaIIb 16. CmcTeMa HppHrC111H~r 17 IIonKJIO⁴ICnIa K TCM)KC BI,Ixo,aM 6JloKa ynpanncmmx I. 9TO H 6nox turraHHM 2. a CC IK)aAUuf7 H IIOMY11.1111di *nioxOnbl* 18 11 19 o6i,cnuuctla n IlaxoIloIHHKC I 1 (14).

30 .11y4untii napuaur acyulcc•rnrncmi u•;u6pe^rrcu1SI Ha clmr.2 upacratuicll uapHat1T ycrptHeTlia c TlieIt na•tapaMH 3. 4. 20. Ha oi1Tli4ccKuui oclt Jla•;epa 20 ycpaiunrcun *inpax(aTenbHoe* lcpxau() 21. xfTOpnc Tax ACC, KaKH in' a'rCJtbnoc TCpKWii.7, IIoaKJUO'etio K 6noxy yllpalutetiHA I. H B luVIOMte11HH A yC'aHaIIIIHIIACTCA BOA yrlIOM 135° K OnTH4CCCKON OCH, a li fWIOM(CIIHH B napaiucniato CK. Ha ETON A(c OIITH4ccKO

35 OCH paellOno)KCIibt 4#)OKyCHpyIOH1:WCHcTCMa 22 H fXOJLHOH TOpeu OiITH4ecKOTU Bonoxila 23 c ItaKO11C411HKOM 24. MC)K y 4poKyempyloaiel% CHCTCMOI 9 i4 CCJiCKT1tnIJbIM •tepKanoM yc-r lto1L1ein RTOpoe ccJICKTHImloe 3CpKanO 25. KOTOpC)C OiITH4CCKH ColI,pA)KCIIIO C TepKaJIOM 21, 2 KyCHpylouterl CHCTCMOH 9 H BXOnnbIM TopUOM oITTH⁴ICCKUit) lionoKlfa 10. CCJICKTHBItoe 3cpKar10 25 OTpa):aTCnblo IU H'tlly4C11HAC JlnHtIOH nuniii Jtalepa 20, no npoipa4110 n.n

40 It37ly⁴CIi{11{ 4 JUIIIAMH UoJlii Jla•3ep0B 3 N 4. BJlox 1111TAiiH5i 2 cocanrell c na3CpOM 20 4Cpc3 3BCKTPollub»a xnio4 26l.

Ha clmr.2 upacratuicll uapHat1T ycrptHeTlia c TlieIt na•tapaMH 3. 4. 20. Ha oi1Tli4ccKuui oclt Jla•;epa 20 ycpaiunrcun *inpax(aTenbHoe* lcpxau() 21. xfTOpnc Tax ACC, KaKH in' a'rCJtbnoc TCpKWii.7, IIoaKJUO'etio K 6noxy yllpalutetiHA I. H B luVIOMte11HH A yC'aHaIIIIHIIACTCA BOA yrlIOM 135° K OnTH4CCCKON OCH, a li fWIOM(CIIHH B napaiucniato CK. Ha ETON A(c OIITH4ccKO

OCH paellOno)KCIibt 4#)OKyCHpyIOH1:WCHcTCMa 22 H fXOJLHOH TOpeu OiITH4ecKOTU Bonoxila 23 c ItaKO11C411HKOM 24. MC)K y 4poKyempyloaiel% CHCTCMOI 9 i4 CCJiCKT1tnIJbIM •tepKanoM yc-r lto1L1ein RTOpoe ccJICKTHImloe 3CpKanO 25. KOTOpC)C OiITH4CCKH ColI,pA)KCIIIO C TepKaJIOM 21, 2 KyCHpylouterl CHCTCMOH 9 H BXOnnbIM TopUOM oITTH⁴ICCKUit) lionoKlfa 10. CCJICKTHBItoe 3cpKar10 25 OTpa):aTCnblo IU H'tlly4C11HAC JlnHtIOH nuniii Jtalepa 20, no npoipa4110 n.n

It37ly⁴CIi{11{ 4 JUIIIAMH UoJlii Jla•3ep0B 3 N 4. BJlox 1111TAiiH5i 2 cocanrell c na3CpOM 20 4Cpc3 3BCKTPollub»a xnio4 26l.

- Pa311013HisIOCTIMH npHCM1HKa H114X pMailtH 15 0 COCTOAHHH GHOTKall
16 i.oyr 611r1. **Kax** CnciTpoaltaIH3aTOp **27 (ciHr.3), Bawl** xOTOpO
 ORTH'ICCKH conpAMcell C McCTOM 1103ACNCrthHA Ha 6HOTKaILL **16.** H 1(OTOpb111
 COCTOHT H3 **AHCACpCH01111OrO** 3IICMCHTZ **28.** AHuiCr%H dxYTOACTeXTOpOB **29.**
5 pacnonoxccHHOH MCCT.0 COOTBCTCTByIOWCMY 0611aCrH AJIHII BOJIIr **200 -**
1500iIM H 3110MCHTa cpaB **eHHA 30;** TaK M **4** OT0911CKTpH'CCKH i npHCMHHB
 Hir(Ppaxpacnoro in.ny^gCHHsi **3I,** OFTWICCKH COnpR)KCHLLri C MCCTOM
 130311ciCrBHa Ha 6HUTX1aHb **16** JIOCPCACrBoM OITTH'ICCKOrO B011oxHa **13 (10, 23).**
4)OKyCHpyKOWCH CHCTCMLI **12 (9. 22)** H fOBOPOTHOrO 3CpKJJa **32,**
10 pacnonozeHuoro McMCAy tj,oxycHpyloweH cHCTCMOH **12 (9. 22)** H 3Cp?anoM A
 Mnli HcnocpecpneHHO nepeA Bi. xo bt, 3epKanoM **Aa3epa 3 (20).** 17epeA
 OHTH'ICCKHM BXOAOM **11)OT03JICK1pH'leCKOC()** npHCMIIHKa **31** ycrail:Men
 HHtf)paxpaculdi OVILTp **33.** nculoca nponyCKaHHW!Kolupum!HCKJAO'taCT
 fcnaAaHHC IIII %.,TO1rnCKTpH'1CCCKHH npHCM1HK **31** H3jiy'ICHHA .na3epa. B
15 Ka'iCCtise npHCMIn n a 11114x)pMauHH **15** o COCTOM111tH GtonOrH9CCCKOH TKaHH **16**
 MO)CCT 6LR6 H axvcru'CCKiiH tnpHCMHHK **34,** pacnono*Cnmd% B6rmm ;Accra
 BO3ACrCTBHA Itil TKailb. - TAK. MTU ttatlpxacHHCl-Jcr0 **MaxCHMWlw** OH
 'yeCTBHCT11b11OCTH COCTaMAeT C OITtH4CCCKOH OCLIO H311y4CHHM Ha BLIXO11C
 ilaxolle'1HHKa **11 (14. 24)** ynul a, JICKLIHHii n!lpenenax OT 11°11086°.
•20 B *CBA3H C TCM.* 'ITO 'INCJ10 npHCMIIHKOB Mnl4)OpMB11111 n!cocroAHHH
 C)HOTKallH MO)KCT X0JICC)aTLCM C)T01111(01111b) ACIMTH (no Ka)KIIOMy BHAY. OKOJIO
 KazA(nx)!naK0ne^giiHKa). XI H' a.-,I t) ItX(AC)0 Gnowa ynpanneliHM MOxct r)Lrrb
 panlit) MCRRTH).
 CHCTCMa 0p0n11c111t2 **30111.1** o6pa(cn*KH ' **17.** Hro6pixcC1111as **lla!,(Hr.4**
25 cOCTOHT in!prscpnypa nJIM 111111.1 II)AMILIM HaCUCOM **35.** K KOpOMy
 npHcoc11Huella!noAonpoBOnsru1asl *Tpy6xa 18,* H lunaynulOn) KoMnpcccopa *3b.*
17pHCOCBM11ctJ1101e K 10311yHIIOMy KOMnpccOp *36* 1U)) (0npco011aulltc
TpyxH 19 cna6xae;n,i WleKTPOManlHTIIWMH KJJanallaMt **37..38. 39.** Kenop1,C
 IU11KaIo'leHli K TeM MCC IILIXOAaM GnoKa yripalUetlira **1.** HTO i1 6n0K nHTatlfM **2.**
30 'sepezlnHlHH 3a iCp,IKK **40.41.42.**
 YcrpoHCrn0 pa6x)TaCT CfCAYloniHM 06pa'1)M. Fbny'Ienhls.naicpon **3. 4.**
20. B Cny'ilce Itaxuxutelltl t)TpaMClrrutt►nLtx UEIK/III **7** H **21 n** 110MOXCIIHlt B.
 upoliia (I)OKycipyloicnc cFlcTcMla **9. 12. 22,** trrpe um OHTH'ICCKHx i olicK0r1 **10,**
13. 23 H 11aKU11CN11HKH **1 J. 14. 24** IIOClyHaLOT Ha aliTH'JCCCKHC BLIxOut.i
35 ycTpoi"icTba.
 Ecnu orpaxcarc.miali.lcliepxana **7** li **21** Iraxousrca B nmno)fcC111IH A.
 irsnycuuc ria3epa **3,** **OTpa3HB11HC1!OT** 3CpKaJJa **7** nonanacr. Ha **CCACKTHM10C**
 3cpaxa) **8** H. opalHIIIIHei, oT Helr). Itailpalul)ICTCM II110J11► 01TTWICCICOr1 OCT1
 na*scpa **4.** Ananunl4rul, upu Hammitt **Jla*scpa 20.** WUly'it:hHC ;role) **Jlalcpa**
40 OTpa-iHBUIHCL OT **3Cpxalla 21.a 3arcM** oT -cmc:KTHIMIOIO **3CpKWla 25** TaKMce
 HanpaicTcx!iln(sJll, unii'icckOH UCH **Jla*scpa 4.** B pc3ynt►TaTC, II **CBR1HICO**
 CBOHCTb)M ccncKTHIIIIIX iCpKar1 **8** II **25.** B (~c)KyCHpylwylII **chCTCMY 9** If, TCM
 CaMJ IM Ha OATH9CCCKHH 81,IX011 11aKOHC'itHKa II MOM nOCrynaTL H1J1y'JCIHR
 nCCX Tpex Aa3ep011 0111io11pCMCn110.

- Bb16op BH11a 11pHCM11HKa Hncbx)pMauHH 15 o COCTOAHHH!6HorKalIH 16
3aBHCHT or BHJa TKarIH H!pC1CHMa!o6pa60TKH.la Tax)ICC. OT!BHAA HaxOHC4HHKa.
npH!pa60TC!C!HCKO11TaKTHLIMH. 11aKOHe4HHXaMH OCHOBBa9 4aCTb 313Jly4e.HHA
apomoniiro t!JaxC11a, B0311HKa10wer0 H3-3a!CBC!4HHA!y!iaAACMbIX!iaCTH!
5 6HOTKallH!JICACTH!Is BHAHMOYt H!(JH1ICHNX yJibTpaCtHOJICTOBO! H Hur)paxpacHoH
o6naci x cnexrpa (200 - 1500tiM) H nMAerc9 npH4HH011!HCB03MO)KHOCTH
B143yallbiOro!Ha6J1TOACIHH!1H/1a!H!COCrOAHHA GHOTKaHH. CICKTpanibHLIN COCTaB
H31.y!CHM\$! 3posHOHHOro 4xu c3a 3a^gr.CHT or BH.aa 6HOn aHH, noaTOMy
He06XOIHMH CncxpanbHWH aHallH3!3rorn!Kanr!CHNA, KoropoC nonanaCT Ha
10 1HCHCpCH011HLa naneMCHT 28 CnCKTpOatannH3aToPa 27, pa!JiaaerCH!B Cne)tp H
nonauaCT Jla nHHetixy!cirooACTCKTapoB 29. COCAHllc!yO C!3JtCMC11TOM
cpanneliNA 30. Ypottellb Bbixont1010!raJICKTpH4CCKOFO CHnlaJia 3JiCMCiiTa
CpaB11C11HH3(!)COOTnCTCTnyCT!KinIKpCTIloll K<)M6H1IauIH AJIH1 tso.n cll!eKpa
H31y4CHNH p03H011110r1) ihaKC11a.BJIClap!H!CCKif CHrHaJ! OT 3JICMCHTa
15 CpaBileTHA 30 Cr1CKTpOaIMH3aToPa 27 nocryiaET!Ha!BXOA!6no.a y!ipaBTetiHA
1. CAC!Bbipa6ambinacis!C.NrttaJ!H3MCIIHHA!pCIKHMa!H3!1y4CHHH natcpoB.
Pa6opa c KOITaKTH,IMH 1laK0HC413HXaMH CBA3aHa!C llarpCBa11HCM
J1a3Cp!LIM H31y4CHNCM T0pua paGo'iero H11CTpyMCHTa (ROIOKH ilIH
CailchnpOnb!i 1aKOHC4HHK) AO onpeacnenilo! TCMiCpaTypU!aocTaBilloit nna
20 pa'pyieitiu 6HCTKanin. 1!arpcn - MCCra &IIBCNCBHA COApOBOX!aCTC\$1
BOIHHK11OHCHHCHM!1!chpaxpaC!cn) H311y4CHHx!XOTopoe!nepcaaCTCA no B01IOKH
ilaKOHC41HKa 11 (14. 24) H olpelxy OIITH4CCKop!1s0J1oK!ta 10 (13, 23) It
ilanpaHite t!Hit. O(!paTHOM xony na3eplott) H3Jly!CIIHA. oTpa*aeTcx ar
nonopcmlon) 3epxatla 32, npxnAHT HllfpaKpachLIN!ch11116Tp 33 H 11onaziacT na
25 ttUT0:9J1CKTpH9CCKHH!1pfCMiHK 31. arieKtpf4CCKH41 CHINa!l C Bb1XOA!
chOT05)11CKTpH4CCKort) npliCMiima 31 noCpynaCT B!6JiOK ynpaliMCIIHA 1. CAC n
3aBHCHMOCTH OT napaMC.tipOB Brow CHIIa l:1 iii,lpa6arl.inacrcw ClinlaJl!:
OcrailoirxH!npOAIJ!)KCIHR HJH N3MCIIHHA!pC*HM!lpaGOTb1 Ila3epa.
3KC1CpHMCIIJaTt,llo yCTa!)OMCIIO. 4Tt) TCIIJIOBOC H3Ay4C111e.
30 IK1311HKa10111CC npH!lpa('OTC!C!K011raKT11bIMli HaxOHC4HHKaMH ItaXOAHTCA n
rny6OKOA NllrhaxpaC!l!o arilacrii. B Bur^g CranaCTH!iyncrnHrcnt,Hurril
(~)6)T0111CxpH4CCKHX ripHCM11HKO c)4cnb Maltu. CnCKTpall Ila^g u(n 1CTb
H311y4C!rHA Jla3CpcB TaK*KC!JICXCIUT!B!HiuCT!paKpac1IUM tif3Ilacrii. noBTOMy!t!OJ1OCa
llpOITYCKallHR Hllchpaxpach!oro tmH111,Tpa 33 CcM Hacona11a co cnCKTpajlbliOH
35 4yBCTnhiTCJ11.lloC1bK!)4X)TONpHCMiHKa 31...c OKIOM!nperipa411OCTH!OIITH4CCxOrc)
Hnaox!ta 13 H!n&Ct!C!IHaaE!HCK11104C11HC!nOllaaalnHA na chnonpiie.MHI!K 31
11111y1CHNA!na3cpn 3. 4. 20.
fpouyxl.1 na3eplio pa3pyWC11HR 6HOTKallii painc^ralorcx t0
CBCpX31syKOPOfi CKOpOCTHO. H!it CJICACrBHC pCKOP)!HWMCHCIIHA Aa1slic11t1A Iri-3a
40 conpOTH1111CIIHA epeaLI rCHepHpyCTCH!axyCTH4CCKUA!IIOJII:l. AjiA pa3r11!lub1X
TKallCA aMniunyua axyCTH!ICCKO BOIilhl!pu3fH41a. Amin) TyAa. axyCTH!1CCxc)ji
BOnil.t perHCTpHpyCTCN aKyCTH4CCK34M!lipHCMiHKOM 34, 3Jlexrpit4ecKHit
CHrllaJl C Koropopo T1OCTyrlaCT!Ha!6J11K!yrlpall1C1111A 1. me CHITC331pyCTCx
chntall Bpemicit10H Ocrannnkif iiviy4cuns Wiii!t3M1IICIIHX!pOKHMU!pa6x)Tbt

naacpa B 3azite1MOCTH a-r THia o6p:16am1naeMo% TKaHH HuH H cny'iac
npCBI4111CHHA 9HeprHH na3eptlollo HMnynbca Han nopopoM pa3pyWcIIHA
6HgrzaHH. 'ITO 1UIHACT Ha CTenellb na3cpHoro Hexpo3a.

- 11pexpaweHHe. a Cny'iac Hco6xoAHMOCTH, pC)XHMa H3Jty'1CHHA na3epoB B
5 CoOTDCTCT nH C CHrJlaJlaMH CncXTpOaIIami3aTopa 27. 44oToJJICKTp31 ecKoro
W1H azyCT VICCKOro np1CMHHKOli 31 H 34 npoHCxon'i' C IIOM011b10
6blerponeHci ytuowx HJlexTpontlix K4109CH 5, 6; '26. CHrHan c 6Jloxa
ynpanrCHHa 1 nonacTC31 Ha ynlpaBaAoulHN BXO aJCKTpOHHO O ICn104a 5, (6,
26) pa3MwxaA UCnb nHTaH14A xa*1101.0 H3 na3epoa. HpexpallcltHe HMnyJbca.
10 H31ly'1CHH4 91txJICKT114110, CCJH BpCMA OTU110'1CHH11 nHTa1HR MCHLWC
JUIHTCJlbHOCTH HMnynbca H34y9C1111A. (AJHTC11bHOCTb HMnynbca HJty'1CHH2
MOZ T 6Lth 150 - 500 Mxex.). HoirroMy u xa'Iec-rw 3Jic1CTpollioro xnlo4a
ao.nzCII HcntJlb3o1wrl cx: nemetrT C BbICUKIIM 61,1cpoaclicTnHCM. TaxHMH
ynpaIm(eM1.1MH KJIK19aMH EIUROIICA nUS1yHpo1101111KODble HJH
15 ::u1CKTUpouaiyyMli,lc 11Cp&3UUt'la1'CJ111, BpCM7i Cpa6aTE,IliallHH KOTOpb4X VC
npclSLWIicT IO() MKC.

- OpO111C111ne 6HcirKa11H C IIOMOWblo HppHra11HO11017 CHCTCMLI 17.
rlpoHCX04HT C11C1tylo11111M O(pa3OM. H3 pelcpRyapa AJIR 130A1,r C 11o11Anb1M
IcacOcoM 35 nova 3anoJitlsCr IulnollpononRutnc Tpy61H 18. B cny'tae
20 11eOCxc11HMOCTH OpoWCIIHR TKallt CHnianla N3 6nnxa ynpannCHHB 1 nocrynattrr
Ha aJICKTpOMan1HTHraf x ianalt 37 (38, 39), KOTOp&IH OTKpb4DaCT HOCTy11JICHHC
11ITIAyXa 1104 nawle11HeM in 11⁶311y11t11Oro KCIMripCCCUa 36 n no34yxenpo11012 19.
KC»IUBI BUAU- H 1urinyxupoicwXHtnx Tpy(xn: 18 It 19 pacntlnuzclibt u
liaxonc'ntnxax 11 (14, 24) TaK. 'iTi) nncnyrulclHC. f101111 Ha HppHtaalmo 1111c
25 Dlxonr.l ycTpOHCTBa 11 01WX J111T lipH rloua'IC 110311yxa 110 npltnlniny
nynnepH3artpa.

- CHflaJlLi H3 6JInia ylipanliurnM I ntx.~ ynialln' Ila 3JICKTpt/Mar11HT1111e
Knanaill1 37 (38. 39) 'Icpc3 n1BIHH 3aUep)KKCH 40 (41. 42) OAHOpCMCIHO c
CH111anaMH 3Wlyca KMliyJl1C1)IS rCliepauHli Ha3CpOIS 3 (4. 20).
30 Opa11C111C 6HuTKa11H Isouorl 401O:1UO I1pt1NCXWIHTb a 11p0MC:Iy1KaX
MC*J1 HMnyJbCaaMH H1Jly'JC111t9 11:13Cpoll (c 11C11.10 H36C) KaTb IICZCJ1fTCn1fOC
pacCCM111C iruiy'lt;tl1tR J1 11t1114CHTb ~cJ1c~x:Klin11r1CTL Opa111C11114). HOBToMy
1UHTCJl11OC •b I1pCMCHH 3 uepxu:H J1H11HH 3aJlepzKH 40 (41. 42) , panful .
11pCMCIHION ,I J1HTCJl1r,lic1CTH HM11yJl1tY1n innycli}t3i Jlaicptln C y'SCTOM ISpCMCI11i _
35 11OCTy11J1C11H31 Iu)3nyxa K KO11U1aM Tpy6UK 19.

11pBMCP x011KpCTHuri pCaT1H1aUHIi 3a1MACMbIX yCTpoHC.mI COCTOUT n
cnenyluuLCM:

- Snort ynpatncnHN 1 (01r. 5) coCTOHT 1i3 ycHnltrencl BXOA111X clinlanols
C H11TCrpaTOpOM, flocbMitKa11aJlb11c)ro JicC:ATHpaip2ntloro a11W1Oro-unr13pOIK)ro-
40 npC06p83OpaTCJ1}I (ALM) C noCJ1c4c)IcSaTW11.1314M H11TCpCj)CHCOM max 192 CepHH.
npU1teccopa PC-104 Knap11C111M 1'Cliep:rroproM 11 BOCbM1iKa11W1b11oro
TpHHa111aT11paipAUHo11 ItH1pptt-anaJ1b11u)1T1 r1pc.u6pa3uli;rrcilt (Uaf) . c
n0CJ1CA0B3TCJ1 11b1M H11TCpCf)NC1dM max 540 cepim. Bblxouuble CHrHant4 LIAH
1W1CYCCJ1 814XO11aM1i 6JIOKa yllpaIUIC1110i 1. 110 TpCM H3 KOTOpbIX, K11uMe

cHtllanou 3anyexa NMnynbcoi rencpainHH.noc1yna1AT CHntalllL. onpeaeJlsx►WHe
BCJIW1HHy ʸ1lcp1'NH HaKOIIHTCJILILIX KOtilelCaTOpOB drum mirami^g 2.

- 5 B xa'IccTBe naaepos Hcnori63ycTCa 11a3epLI: Nd:YAG (*lama swami
1.06 MKM HIM 1.32MKM). Ho:YAG Omuta BOJHJI 2.09 MKM)H Er.YAG (IIJiHna
nonHJI 2.94 MKAl). B xa'iccrnc JLHCncpcHOHHOTO 911cMCHTa 28-crex.nsiwHaa
npH3Ma.. B Ka'1CC11e. ttXTt'OACTCKTOpOB 29!- KpCMHHCBMC nofynpOBOUIIHKOBLe
t oTOAHOALI 431A-256. a a Ka'IeCTBC • 41oTOWICKpH'iCCKOpO npHCMHHKa
H14paKpacHoro H311y4CHHR 31 . -rc^PManHe it (jx)TOHHOH X11-9. 3ncMCHT.
CpaBHcHHa 30- .MHXpoCxeMa K554CA3 1inH LM-111. AKycrn9Ccxmi
10 npHeMI(Hx 34 - MHKpO410H B&K4138..

11poML1IU1CHHa11 npHMCHHM0CTb

- TaxHM OCpaloM, npennaracMLte yetpoileTna. 3a c4CT COBOKy1111OCTH
3atIBnACM10IX npH31naKOB. o6 elle'iHBat onepaTHBItoc ynpaBJeHHe, c
1103Mn7K11OCTbIa 11apbHpollaIHS1 11 IIIHpOKoM nHaIMOnC napaMCTpaMll na3Cp}OI•(t
15 Htny'teluHfl, 110711OJ1AltTr IlpOHU1LHTL XHpyprH'IccKI a IlpO11CAypbl Ha 6HOTKaHAX B
Ka'ICCTise JIHfied CKant.nW L. JIH60 KOaI PJIATopa. JINGO ACCTpyKTOpa B
3aBHCHMOCTH OT Tpe6ycMLIX •THnytt.. pecHMofl H CO'iei a[iHli pa(oTLI J1a3epOB.
opHeirrHponailil63x 1ta MHIIHMa1H.1tyM1 .TpanUaTN'lltocTb npH nalltitl i BHAc
UO3HCHCIBHt Ha Aaittyio CHoTxaln..

4opfeyjia iuo6pe euw

1. YCrpolICTBO NIA na, cpnoit 06pa6oTKH 6HOnorw ccKON TKaHHH, COACpKCa111CC 6JLOK ynpaluleHHA (1). BLIXOAW KOTOpOrO COCJIHHICHLt c 6nOK6M nHTaHHA (2) J1a3Cp0B. HMnynLCH11C n83CpL1 (3, 4), ORTH² CCKHC ocH KOTOpbIX
- 5 napaJfnCnbHLL. OTITHLICCKH CONp2ZCHHLIC OTpa)1CaTCnIHOC 3CpKan((7) H CCJICKTHBHBO OTpaZaTCnLr1oe Jinn n7IH1w B0JHla nepBOrO Jia3epa (3) tt npo3pa¹iHOC .unfl JUIHHw BOuHw BTOpOpa na3epa (4) 3CpKanO (8). KOTOpb1C pac11cJ107IcCHLI Ha. OnTHHCCKHX OWIX HCpBOFO 'H BTOpOrc) J123CpOB COOTDeTCTBCHHO, ycTaHOMCHHLIC !la onTH'1ecKOH ocH sroparo na3epa (4)
- 10 dOKyCHpyIO111y10 CHCTCMY (9). H OHTH'icCKOC -OJ1OX110 (10) CHaxoHC'iltHKOM (11). BLIXOH zOTOpOrO AtJIACTCA onTH4ecx.HM BLIXOHOM yCTpOi CTBa. oTJ1H'1aIoIu000A TCM, '1TO B nerO nac ie i XOTJi 61i own) nPHCMHHK Hlt})OpMaUHil (15) O COCTOAHHH (H011O'H'ICCKOH TxaliH • (16), nxon KC)TOpOrC) conp)OKcH c MCCTOM B03Aei CTBH Ha CHTrrKamm. (16), a BLIXOJI COCAHJCH C DXOHOM 6nox.
- 15 ynPaMCT'HSi C). BLIXtula KOTOpot COCAHtelli c HxonaMII B.nCKTpOH11bIX xnio'1ci (5., 6). ycraonncrnu.ix n ucunx C0CJIHHCHHA Ka)Klaort) naaepa c 6JOKOM HHTaJii (2). xpQMe Toro; OTpazaTCJmIH)e 3cpicano (7) yCTallOMCHO t, B03MO)K11OCT1.10 BWBOAa Cr'l)H9 xona H3ny'fCllttA. a lia OHTH'ICCKOH ocH nCpBOrC) na3epa (3) nocncnonaTcnLUO nu xoay H'yly'icnit51 pacnonOxcella'4 OKyCHpyIOwa i
- 20 CHCTCMA (12) H OrlTH'1ecxoc Iuuic)xno (13) C HaKOHIC41f IXOM (14), B11X0 KOTOpOrO RWI2CTCA ApyHM O1rTH'ICCKHM iLIXUJ1OM yCTpOACTBa.
2. YCrpOIACT11t)J111J1 i1;llt:pftoM o6paroTNH (iHOJ10rH' eCXOH TKAHN. cOllcp)Kaulce 6nOK yllpaMcfrrlM (I). nLXC)llra xoTopnra CoCJIHHICIUJ C 6nOXOM nitTaHHH (2) Ha3epun. IlMllyJshetLU: Jfa•1Cp1.1 (3. 4. 20). anTH'1ceXHC ocH
- 25 XUTnpblx J1apaJ[neJ1Llt.1. OHTH'ICCKH col1pAXCcl11bIC OTpaiMcaTe110110C 1Cp:aJ1t) (7) H CCJICKTHtutft oTpacxaru.iiue JyJ! aJHHM HW)Jtella 11Cplu)11)))a3cpa (3) . H npcspa'1[1t)c JJJdi Juiiin i• 'nun)! Inupoly na3cpa (4) •icpxivit) (8). x0-Tupi.1e pacnono*Clw ua oilTHVCCK1tx OCAX ncpl1011) H BTaptm) J1a3Cpon cc)OTDeTCTielnu), ycTaioi icirnlac Ha OHTH4eCKi)H. ocH' ITOpOrt) naiepa (4).
- 30 t OtyCHpylo1rlylc) CHC CMY (²) H OHTH'1eCKuC 110at)X11o (10) C 11aXOHC9PHHKOM (11). DLIXOH KO TOpOlt) AUIRCTCA OlrrHllea; HM Ii IXOHOM yCCpOHCTBa, OHHHHCILICeC) TCM, ann. B Item Bnc acii Tpc rnii NMnyJf.etlb i J1a3Cp (20), onTH'1 CKWI OCL KoTnpolu iiaPaJ1J1U1L1ta unrlivecKHM OcxM. altyx IlpyHX J1aiep01i. yCTallt)IUC110 crrpa*aTCJ11)11OC 3cpKaJio (21), npH'ICM OTpaWCaTCJ1L11Lic
- 35 3CpKana (7. 21) yCTalrunrCIL11 t: nenM))KHOCTLIO nlaltOlla HX H3 xona H311y4CIIHH. It Ha onTH'1eCKOH J1CH BTOpOH) J1aiepa (4) 3a L't;11eKTHHHaM, 3CpXa11OM (8) yciatiofuleiio BTOpC) C ACKTH11110 oTpa*aTeJ161100 J1IH J1UHHI1 110J11L1 TpCTLCrO nalepa (20) H rlpCnpa'latx; Jinx Jutlin ROM! iicpnoru H BTOpOH) J1a3CpOB (3, 4) 3cpxaftu (25) nnTH'1ecxll Cortpax:citiuc c urpaxaTCJ1L11.1M 3epKanOM (21) ,
- 40 yCTallonneuMM lla onTH'1ecxoil OcH TpeTb.efx) J1111Cpa (20). t)OKyCHpylo1.uct CHCTCMort (9) n ltxOAoMl'1TWleei oro 110noxua (10). paCluono*ciiiu rX lla Oaf nropopOJ1a3cpa (4). laa iii ilt)ri tri oceii ucplu)IC) H 1pcTl.cru nalcpun (3. 20) iociiei1onaTCJ11.1in no xoiy i13Jy'1e111H pacucuo aail.1 t n);ycilpylo1mui (12. 22) CHCTCMA H of Th'ICCKue HOJ1O alo (13. 23) a flaX011e'1H11fKOM (14. 24). J1raxuu).1

KOTOpUX AafAIOTC31 ApyrHMH 011TH9CCKHMH BMXOlraMH yCTpOHCTHa, cHa6xenHoro **TaXXCCIXOTA** 6m OAHHM npHCMHHKOM HH470pMaUHH (15) o cocTo **HHH.16HOITort19CCKO1iITKaTH(16)**, **BXOA** KOTOpOpoCO11pA CHICIMCCTOM 803,\$CpICTBHA Ha 6HOTJCaHb (16), a **BLIXOA cOCAHHcii** c **BXOAOM** 6nox4 yllpaBJICHHA (1), **BbIXOAbI KOTfpCrO** COCAHHCHW C **BXOAOMI'JJICKTpOHbIX** xno4e % (5, 6, 26), ycranoMe iiLwx n utnxx cOCAHHCHHA KaRCAOpo na3epa (3, 4, 20) c 6noxoM MITaTHA (2).

3. Ycrporrio no n.1- 2. OTJIT'ialouiteca TCM. TM. nplCMHHK HH4)OphalaHH (15) o COCTOAHHH **6HOiorH'lecKON** TKaHH (16) Bbinonnci a Brine **CnCKTpOatijiu3aTOpa** (27) a **06naCTH** 200 **HM!**- 1500 **HM**, **BXOA/KOTOpOpo** OTTH9CCKH cOnpAJKCH C MCCTOM 1103ACpicaHA Ha (HOTKau!(16). H cocroxlicrO HT aHC11CpCHOIFlorO JJICMetra (28), nHICHKH ()OTOACTCKTOpOI (29) H 3neMeUTa CpaHHCHHa (30).

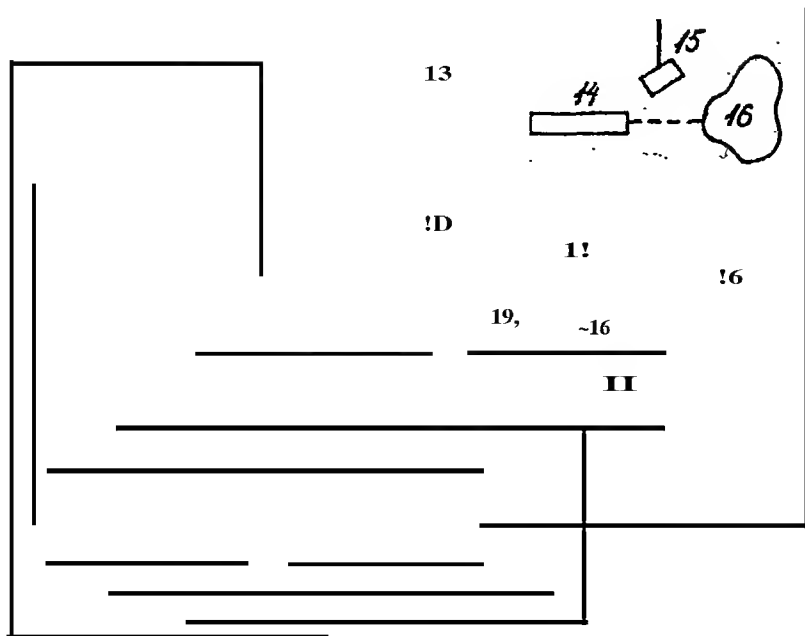
4. YcrpOHCTy) no n. I, 2. OTJIT4auOUI000)1 TOM.'ITO!nplCMHHK HIpOpMal1HH (15) O!cot.'TOAIHKI6HTUit)rl9CCKOpITKIIHH (1t1) iu.nninic11 n mutt 4)OToinCKTpH4ecKoro **IlpHCMII iKa** (31) Hrrit)paKpaCIIOTO 113Iy4CHHA. **BXOA** KOTOpOpo OTTH9CCKH **COnpAMCCTII** MCCTOMIicnhiCHCTBnx Ha 6HOTKaHb (16) nocpe cTaoM fonapOTOpo 3epKana (32). pacno.rnn crinoro Ira oni'wi :CKON OCH na,epa (3, 4, 20) Me cny **ifblxmtUIM** 3epKanoM naicpa (3, 4, 20) H 4-oxycnpyroieit CHCTCMOii (9, 12, 22) . 4epci (1)HR13Tp (33) a filont)coH npOnyCKaIIHR. **HCKn109calollac4** nunaaimc t'a 1pIIcMI K (31) **if3ny4CHHA** nalcpa.

5. Ycrpoycr) no lr. I, 2. czTJIH'ralo Itcccx TOM. 9TO npHCMHHK HIIITx)pmalHH (15) o cocpOAlitH 6Htwoni'ICCKOH TKIIHH (16) ni.rnojicicn B aunt akYCTH'ICCKOI'o IlpIIcMIIHKa (34). yeTallortnenIIorel TaKHM o6palOM. 'ITO 11allaluleliHe ell) M.IKCJImail moil 'fyncr;HTCnwicrIt cocpNIACr C HaripalurelmcM C)nTH4cCKOH!()CH tia nt.txone IlaK011c9IlmKa (11, 14, 24) yron a. **ynOMCT11opXI0IUHH ycnomHlo:** $11^a < a < 86^0$.-

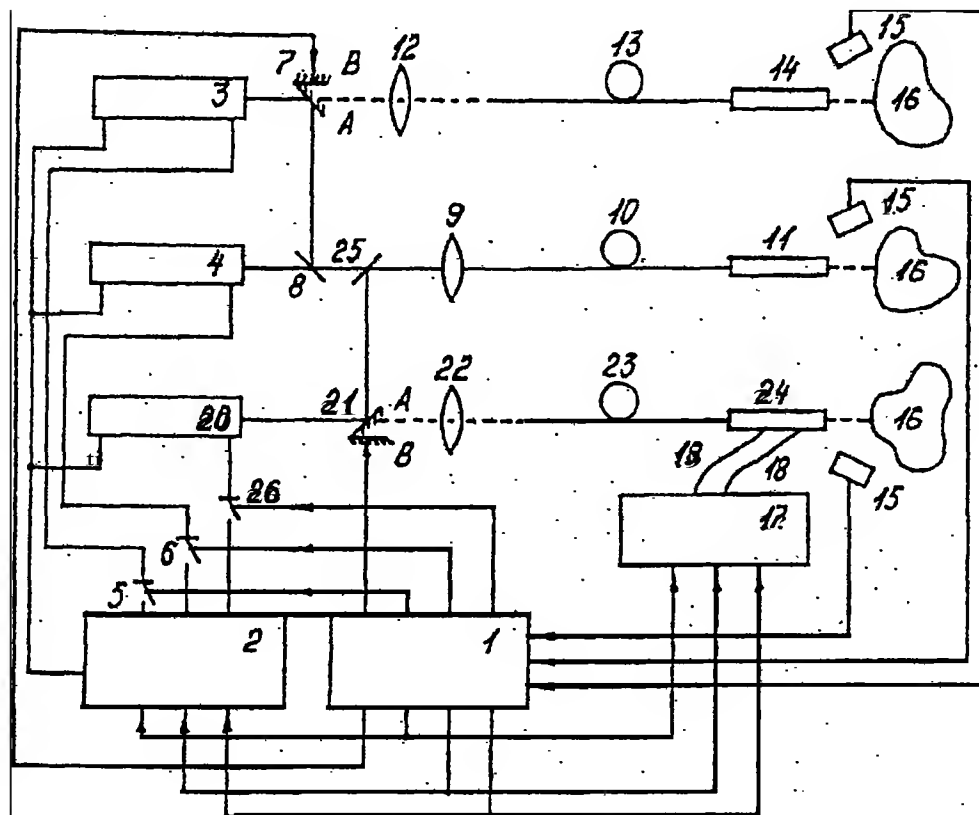
6. YCTpouitmo!no It. 1.2. (rJIH9alO111CCCA TCM, 9TO B.IICKTpOIITbIii)UUO'I (5, 6, 26) B1.InnniCn n **BHAL ilwIynpolu)nlHKnnor)** **HMI!9neKTpotaKyyMII**Oro 11CpC1CJIJO'IUTCIAI.

7. YCTpOHCTIM) no ii. 1.. 2. crr:IIi'alnuicecs TCM, 9TO olio **AO1cu11IHTCJIBIln** c1ta6mcelto **CHCTCMUH** (wirielihA (17), .coc7ciliileH **Hi** pCcpnyapa **IIJIA** 130Afe1 C nourillmM tIacucoM (35) **•ti n rinyuuu)ru• xoolpcccopa** (36). cooTITrcrnytoluC nmxcmbI (18, 19) xcroplax **t>61.enHulcUb1** li **HaK0Iic4IIHKaX** (11, 14, 24) H miunnin'CA Hppinarmiuri1i.IMH **BLIXOnaMH** ycrpOHCTBa, a **1M)3IyLI1IbIii KOMIIpCCOp** (36) a **MCX.TC cOCA)IIiCIUt** c no3UyXOnpwt02aMH (19) cta63,ccIr **Z)ACKTb)MatIHTIILIMH** K.AananaMH (37, 38, 39), **nOAKA104cIIIIIMH** **aMXOAaM** .6noxu **yripanncitla** (1) 9cpc3!JI IHII **3anCpxtKH** 40, 41.42.

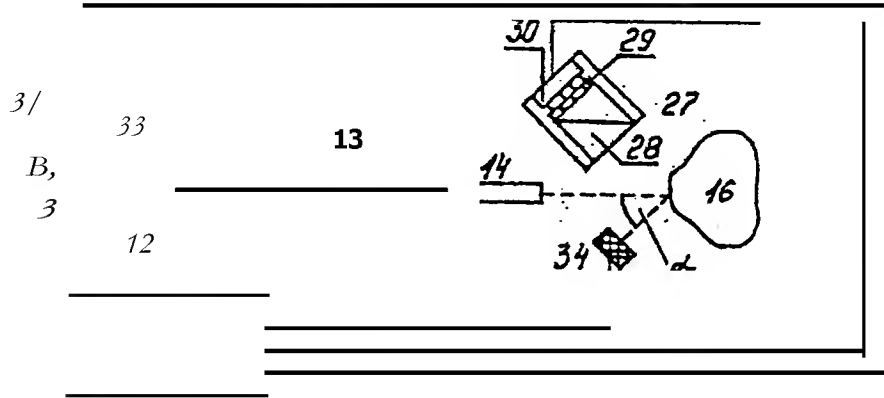
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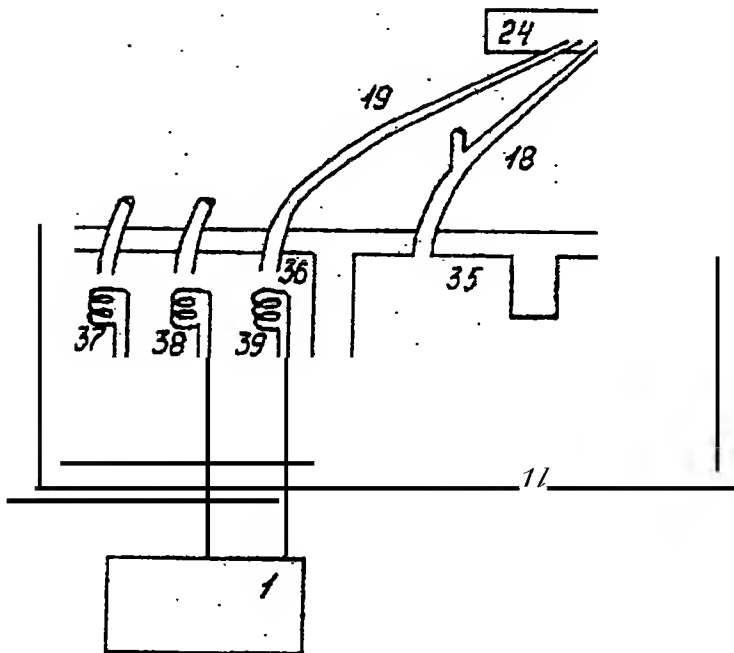
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INTERNATIONAL SET. 6. REPORT

International Application No.

PCT/RU95L00211

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61N 5/06
Awing to Interntat'starel Patent ^r.:siftmtinn (IPC1 or, to !melt :sationel easifmcatioo and :PC

B. FIELDS SEARCHED

Minimum!docuoetatioe!searched!(classification!system!followed!by!classification!symbols)

IPC6: A61N 5/06, A61B 17/36, A61C 5/00

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Electronic!data!base!mnctlted!during!the!international!search!taame!of!data!base!and. where practicable!search!teens!used;

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category'	Citation!of!document,!with!indicatio.n!where!appropriate!of!the!virtual!passages	Relevant!to!claim!No.
A	WO, A1, 90/12548! (VASSILIADIS, ARTHUR et al), 01! November! 199.0! (01.11.90),! the! description, pages! 1,5-9,! Figs. 1-4.	1, 3-7, 2-7
A	EP, A2, 0429297! (HAMAMATSU! PHOTONICS! K.K) 29! May! 1991 (29.05.91),! the! description,! pages 1-5.! Figs. 1-4	1, 3-7, 2-7
A	EP, A1, 0320080! (DIAMANTOPOULOS, COSTAS). 14! June! 1989! (14.06.89),! the! description,! pages 1,4-8, Fig. .4	1, 3-7, 2-7.
A	EP, A1, 0253734(SOCIETE! CIVILE! de! RECHERCHE! "SCR! RECHERCHES et DEVELOPPEMENT"),!20!January! 1988!(20.01.88)	1, 3-7, 2-7

If n ierdtxumeots art!listed!in!the!continuation!of!Box!C.

See!patent!fondly!annex.

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11 January! 1996. (11.01.96)

23! January! 1996! (23.01.96)

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Authorised!officer

Facsimile!No.

Telephone!No.

INTERNATIONAL SEARCH REPORT

International Application No.

PCVR119VfQ711t

C. (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category:	Origin of document, with indication, if appropriate, of the inventor's name	Relevant to claim No.
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SU, .A, 4836203 (CARL-ZEISS-STIFTUNG),
06 June 1989 (06.06.89)

1,3-7,2-7

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A.KAACC!4MKAWta! nPERMETA!M30EPETEHRMR!A61N!5/06

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AeKcu!T!MKH-6: A81N! 5/06!A61B! 17/36!A61C!5/00

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C. 110KymeHTU, C⁶(KTAP)ISHECZ PEAEBATHIMU

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1 A WO, A1.90/12546(VASSILIADI:~. ARTH tr et 1.3-7.2-7
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